

Amendment to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

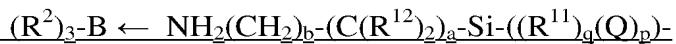
Listing of Claims:

1. (currently amended) A method for joining a substrate having a first surface to an object having a second surface comprising the steps of:
 - (i) applying an effective amount of a curable adhesive composition to the first surface of the substrate, the second surface of the object or to both surfaces, wherein the adhesive comprises
 - (a) an effective amount of a organoborane amine complex initiator and
 - (b) one or more monomers, oligomers, polymers or mixtures thereof having olefinic unsaturation which is capable of polymerization by free radical polymerization

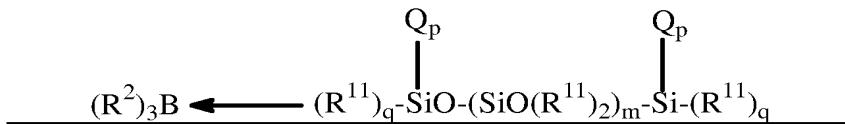
and

- (ii) contacting the first surface of the substrate with the second surface of the object;

wherein the organoborane amine complex initiator has the structure



or



wherein

B represents Boron;

R² is separately in each occurrence C₁₋₁₀ alkyl,

C₃₋₁₀ cycloalkyl, or two or more of R² may combine to form a cycloaliphatic ring;

Q is a hydrolyzable moiety;

R¹¹ is independently in each occurrence hydrogen, alkyl, alkoxy, alkenyl, alkyl amino or corresponds to the formula ((CR¹⁴H)_rO)_n-(NR⁴)-(CH₂)_q-NH₂ with the proviso that at least (R¹¹)' is a primary amine leave this as is;

R¹² is independently in each occurrence hydrogen, alkyl, aryl, alkoxy, and may further contain one or more primary, secondary or tertiary amines;

R¹⁴ is separately in each occurrence hydrogen or alkyl;

R⁴ is hydrogen, C₁₋₁₀ alkyl, C₆₋₁₀ aryl or C₇₋₁₀ alkaryl;

a is a number of form 1 to 10;

b is a number of from 0 to 1;

m is separately in each occurrence a whole number of 1 or greater;

p is separately in each occurrence a number of from 1 to 3;

q is separately in each occurrence an integer from 1 to 2 wherein the sum of p and q on each silicon atom is 3;

n is separately in each occurrence an integer of about 4 to about 400;

o is separately in each occurrence an integer of about 1 to about 9 ; and

r is separately in each occurrence an integer of 2 or 4.

2. (original) The method of Claim 1 wherein the substrate is a roofing membrane.

3. (original) The method of Claim 1 wherein the substrate and the object independently comprise a metal, a multilayer plastic, a multilayer composite, a thermoplastic, a thermoset; or combinations thereof.

4. (original) The method of Claim 1 wherein the substrate and object are thermoplastic.

5. (original) The method of Claim 1 wherein the substrate and the object independently comprise a polyolefin; acrylonitrile, butadiene and styrene terpolymer; polyvinyl chloride; chlorinated polyvinyl chloride; chlorinated/sulfonated polyethylene; ethylene/alpha-olefin/diene terpolymers; or blends thereof.

6. (original) The method of Claim 1 wherein the substrate and the object comprise propylene polymers.

7. (original) The method of Claim 1 wherein the substrate and the object comprise ethylene polymers.

8. (original) The method of Claim 1 wherein the substrate is a first thermoplastic and the object is a second thermoplastic different from the first thermoplastic.

9. (canceled)

10. (canceled)

11. (canceled)

12. (canceled)

13. (original) The method of Claim 1 wherein the adhesive further comprises: an effective amount of an isocyanate containing compound; one or more unpolymerized or partially polymerized compound having ring opening heterocyclic moieties and optionally a Lewis acid catalyst capable of initiating polymerization of the compound containing heterocyclic moieties; one or more compound, oligomer or prepolymer having siloxane groups and reactive moieties in its backbone capable of polymerization; one or more compound, oligomer or prepolymer having siloxane groups in its backbone which contain a moiety which when exposed to moisture forms an acid capable of decomplexing the organoborane amine complex; or mixtures thereof.

14. (original) The method of Claim 1 wherein the adhesive comprises a polymerizable acrylate monomer.

15. (original) The method of Claim 1 wherein the adhesive has a VOC emission of less than about 650 g/l.

16. (original) The method of Claim 1 wherein the adhesive has a VOC emission of less than about 270 g/l.

17. (withdrawn but currently amended) A method to repair a new or existing substrate, object, or substrate/object joint having one or more surface in need of repair comprising the steps of

(i) applying an effective amount of a curable adhesive composition to the surface(s) in need of repair, a repair patch or both the surface in need of repair and the repair patch, wherein the adhesive comprises

(a) an effective amount of a organoborane amine complex initiator

and

(b) one or more monomers, oligomers, polymers or mixtures thereof having olefinic unsaturation which is capable of polymerization by free radical polymerization.

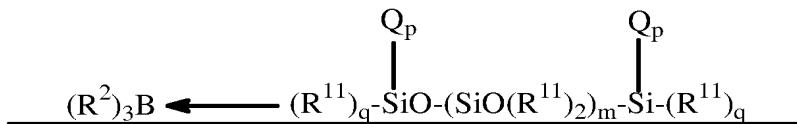
and

(ii) bonding a repair patch to the surface in need of repair;

wherein the organoborane amine complex initiator has the structure



or



wherein

B represents Boron;

R^2 is separately in each occurrence C_{1-10} alkyl,

C_{3-10} cycloalkyl, or two or more of R^2 may combine to form a cycloaliphatic ring;

Q is a hydrolyzable moiety;

R^{11} is independently in each occurrence hydrogen, alkyl, alkoxy, alkenyl, alkyl amino or corresponds to the formula $((CR^{14}H)_pO)_n-(NR^4)-(CH_2)_q-NH_2$ with the proviso that at least $(R^{11})'$ is a primary amine leave this as is;

R^{12} is independently in each occurrence hydrogen, alkyl, aryl, alkoxy, and may further contain one or more primary, secondary or tertiary amines;

R^{14} is separately in each occurrence hydrogen or alkyl;

R⁴ is hydrogen, C₁₋₁₀ alkyl, C₆₋₁₀ aryl or C₇₋₁₀ alkaryl;
a is a number of form 1 to 10;
b is a number of from 0 to 1;
m is separately in each occurrence a whole number of 1 or greater;
p is separately in each occurrence a number of from 1 to 3;
q is separately in each occurrence an integer from 1 to 2 wherein the sum of p and q on each silicon atom is 3;
n is separately in each occurrence an integer of about 4 to about 400;
o is separately in each occurrence an integer of about 1 to about 9 ; and
r is separately in each occurrence an integer of 2 or 4..

18. (original) The method of claim 1 wherein the adhesive further comprises a liquid.

19. (original) The method of claim 18 wherein the liquid comprises water.

20. (withdrawn but currently amended) A substrate having a first surface bonded to an object having a second surface, wherein the bond comprises:

(i) an effective amount of a curable one or two part adhesive composition to the first surface of the substrate, the second surface of the object or to both surfaces, wherein the adhesive comprises

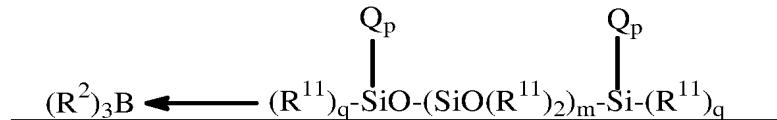
(a) an effective amount of a organoborane amine complex initiator and

(b) one or more monomers, oligomers, polymers or mixtures thereof having olefinic unsaturation which is capable of polymerization by free radical polymerization;

wherein the organoborane amine complex initiator has the structure

$$(R^2)_3-B \leftarrow NH_2(CH_2)_b-(C(R^{12})_2)_a-Si-(R^{11})_q(Q)_p-$$

or



wherein

B represents Boron;

R² is separately in each occurrence C₁₋₁₀alkyl,

C₃₋₁₀ cycloalkyl, or two or more of R² may combine to form a cycloaliphatic ring;

Q is a hydrolyzable moiety;

R¹¹ is independently in each occurrence hydrogen, alkyl, alkoxy, alkenyl, alkyl amino or corresponds to the formula ((CR¹⁴H)_rO)_n-(NR⁴)-(CH₂)_o-NH₂ with the proviso that at least (R¹¹)' is a primary amine leave this as is;

R¹² is independently in each occurrence hydrogen, alkyl, aryl, alkoxy, and may further contain one or more primary, secondary or tertiary amines;

R¹⁴ is separately in each occurrence hydrogen or alkyl;

R⁴ is hydrogen, C₁₋₁₀ alkyl, C₆₋₁₀ aryl or C₇₋₁₀ alkaryl;

a is a number of form 1 to 10;

b is a number of from 0 to 1;

m is separately in each occurrence a whole number of 1 or greater;

p is separately in each occurrence a number of from 1 to 3;

q is separately in each occurrence an integer from 1 to 2 wherein the sum of p and q on each silicon atom is 3;

n is separately in each occurrence an integer of about 4 to about 400;

o is separately in each occurrence an integer of about 1 to about 9 ; and

r is separately in each occurrence an integer of 2 or 4..

21. (original) The method of claim 1 further comprising the step of applying an effective amount of pressure to the substrate /adhesive/object in order for the adhesive to cure.

22. (original) The method of claim 1 further comprising the step of exposing the adhesive to air for a sufficient amount of time to develop green strength of the adhesive prior to step (ii).

23. (original) The method of Claim 1 wherein the curable adhesive compound is a one part compound.

24. (original) The method of Claim 1 wherein the curable adhesive compound is a two part compound.
25. (original) The method of claim 1, further comprising the step of ensuring that the first and second surfaces contain substantially no water prior to step (i).
26. (original) The method of claim 1, further comprising the step of ensuring that the first and second surfaces are substantially oil-free prior to step (i).